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FUNCTIONAL PURPOSE AND DESIGN OF THE SLAG CHAMBER

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The design of a slag chamber and its purpose in float glass molding are considered. Certain improvements developed by the Saratov Institute of Glass are proposed: a device for feeding protective atmosphere into the slag chamber, sealing and heat-insulation of the chamber.

The float method implies the formation of a glass band of preset width and thickness on the surface of tin melt contained in a hermetically sealed tank with nitrogen-oxygen protective atmosphere and subsequent removal of the molded band to the receiving cylinders of the roller conveyor (U.S. Patent No. 1564240, Gr. Britain Patent No. 1010914) [1].

The slag chamber is an intermediate structural unit between the melting tank and the annealing furnace. Its purpose is to prevent the contamination of the annealing furnace cylinders with tin oxide which is carried out from the melting tank underneath the glass bottom surface. Therefore, the receiving cylinders of the slag chamber are detachable, which allows for their replacement, when necessary, without interrupting the glass production, and are equipped with pressure devices which constantly clear the oxides off the cylinder surface. This excludes the penetration of tin oxide onto the next cylinders of the roller conveyor and its renewed adhesion to the lower surface of the glass band.

Another purpose of the slag chamber is to prevent the penetration of ambient gases into the melt tank through the technological opening in the tank. For this purpose, the site where the slag chamber is contiguous to the exit hole is sealed by a refractory tissue curtain and a gas curtain developed by the protective atmosphere.

Furthermore, the slag chamber in the direction of the glass outlet is equipped with a system of locks in which the upper barriers are made of refractory tissue, and the lower barriers are made of graphite rods contiguous to the bottom part of the conveyer rollers.

On the site where the slag chamber is adjacent to the annealing furnace, an adjustable slot is provided for exhaust of the opposite gas flows: the protective atmosphere gases from the side of the slag chamber, and the atmospheric air with sulfur dioxide supplied to the bottom surface of the glass band with the aim of reducing its defects inside the annealing chamber.

Finally, the slag chamber prevents chilling of the receiving cylinders by the melting tank end chiller. Receiving cylinders when they are cold causes notches on the glass band, which leads to the loss of glass.

To prevent cylinder chilling, the slag chamber is equipped with heat-insulating sealing on the site of its contiguity with the end chiller of the melting tank.

Analysis of the patent literature shows that the slag chamber elements are constantly upgraded. For instance, in addition to the top gas curtain positioned above the glass band, a bottom gas curtain is used as well, where the protective gas jets are directed underneath the glass band (Gr. Britain Patent Nos. 1370957, 1373557, and 1017752). The direction of the gas jet can be adjusted to create a more efficient curtain (France Patent No. 2002692). The sealing pressure elements installed along the bottom part of the rollers are made of materials which reduce tin oxide adhesion to the cylinders (U.S. Patent No. 3583863).

The Saratov Institute of Glass has been engaged in the field of upgrading slag chamber design. For instance, an effective solution was proposed for sealing the slag chamber next to the exit opening of the tank (USSR Inv. Certif. No. 1311171).

The Institute developed original solutions for supplying protective atmosphere into the slag chamber and designed thermal sealing in the zone of contact between the slag chamber and the tank outlet, which is more effective for domestic float tanks. Their end chiller is cooled by water instead of protective atmosphere.

These developments were implemented on the ÉPKS-4000 production line and some other domestic float glass lines.

REFERENCES

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